

**Time:** Lectures on Tuesdays and Thursdays at 9:55 AM (Moore Hall – Agronomy 351)

**Instructors:**

Professor Hazel M. Holden

Professor Ivan Rayment

**Instructor Availability:**

By appointment

**Instructor Email/Preferred Contact:**

Room 3424A BSB, phone: 262-4988 Hazel\_Holden@biochem.wisc.edu

Room 3424B BSB, phone: 262-0437 Ivan\_Rayment@biochem.wisc.edu

**Official Course Description:**

Protein structure and function

Organic chemistry of enzymatic catalysis

**Prerequisites:**

Chemistry 345 and Biochemistry 501 or 507

**Overview:** The goal of this course is to provide an overview of the properties of proteins. In particular, the course covers the fundamentals of protein structure and stability and the role of proteins as catalysts. At the end of the course students will be able to apply their knowledge and understanding for critically evaluating primary biochemical literature relating to protein structure, protein folding, and enzyme catalysis and mechanisms.

**Required Textbook, Software & Other Course Materials:**

There is no required textbook, though examples of useful reference books will be listed as appropriate to the material under consideration. PDFs of the introductory materials are provided on-line through Canvas.

**Exams, Quizzes, Homework, & Other Graded Assignments:**

There will be three exams and three homework assignments. The first two exams will occur during the class period at the dates listed below. The final exam will be given during the official end-of-term examination period. The exams are not cumulative. Each exam will be worth **100 points**.

There will be three homework assignments worth a total of **300 points**. Problem set 1 is due on the day of the first exam, problem set 2 is due on the day of the second exam, and problem set 3 is due on the last day of class. The third homework assignment will include two readings from the primary literature, which will require the use of PyMOL. A description about PyMOL and its various functions will be provided in lecture. Hard copies of the homework are required. Please make sure these homework assignments are legible.

**Attendance is mandatory**

<b>Lectures for Fall 2023</b>	<b>Instructor</b>	<b>Date</b>
1. Basic stereochemistry/chemical properties of the amino acids	Holden	Sept. 7
2. Chemical properties of the amino acids	Holden	Sept. 12
3. Noncovalent forces and protein conformation	Holden	Sept. 14
4. Tertiary structure	Holden	Sept. 19
5. Tertiary structure	Holden	Sept. 21
6. Quaternary structure	Holden	Sept. 26
<b>September 28 Exam no. 1 and first homework assignment due</b>		
7. Kinetics	Holden	Oct. 3
8. Kinetics	Holden	Oct. 5
9. Kinetics	Holden	Oct. 10
10. Catalysis	Holden	Oct. 12
11. Cofactors/coenzymes	Holden	Oct. 17
12. Cofactors/coenzymes	Holden	Oct. 19
13. Protein stability	Rayment	Oct. 24
14. How to use PyMOL/consequences of site-directed mutagenesis	Rayment	Oct. 26
<b>October 31 Exam no. 2 and second homework assignment due</b>		
15. Consequences of site-directed mutagenesis	Rayment	Nov. 2
16. Protein evolution	Rayment	Nov. 7
17. ATP-dependent enzymes	Rayment	Nov. 9
18. Structural analysis techniques	Rayment	Nov. 14
19. Structural analysis techniques	Rayment	Nov. 16
20. Structural analysis techniques	Rayment	Nov. 21
21. Membrane proteins	Rayment	Nov. 28
22. Membrane proteins	Rayment	Nov. 30
23. Peptidases	Holden	Dec. 5
24. What can go wrong in an X-ray structural investigation?	Holden	Dec. 7
25. Why take Biochemistry 601?	Holden	Dec. 12
<b>Third homework due on December 12 (handed in class)</b>		
<b>December 18 Exam no. 3 2:45 to 4:45 PM (room to be determined)</b>		